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stratigraphic and paleontologic evidence by the State Geologist, Prof. E. T. Dumble. Of the Eocene beds, the divisions below the Fayette are retained, but the Fayette is limited to the basal sandy portion of the beds originally bearing the name, and characterized by the opalized wood it contains. The succeeding clays are called Frio, and they mark the close of the Eocene. The Neocene divisions, beginning with the lowest, are Oakville, Lapara (the coastal representative of the Blanco), Lagarto and Reynosa. The last is a widely distributed bed of gravel cemented by lime and interbedded with clays and limy sands. The basal beds of the Plistocene are the Equus, the direct correlatives of the Equus of the Llano Estacado, which are followed in turn by the Coast Clays, and the Coast Sands. (Trans. Texas Acad. Sci., 1894).

An account of an important find of Mastodon bones (*M. americanus*) near the city of Cincinnati, Ohio, is given by Mr. Seth Hayes. At least three individuals are represented. One complete jaw of an old animal, as indicated by the excessive amount of wear of the last molars presents the unique feature of two mandibular tusks. On Prof. Orton's authority it is stated that the bed from which these remains were taken is of Postglacial origin. (Journ. Cin. Nat. Hist. Soc., Jan., 1895.)

BOTANY.[1]

Notes on Mexican Lichens. I.—Sometime since a quantity of lichen material from Mexico was placed in my hands for study. The collection was made by Mr. Jared G. Smith and Professor Lawrence Bruner on and about Mt. Orizaba, in the latter part of 1891 and in the months of January and February, 1892.

The following annotated list it given as a report of the results of the study of certain genera represented in the collection, and will be followed from time to time by other "notes" as the remainder of the material is worked over.

Ramalina.

R. linearis (L. f.; Sw.) Tuckerm. Trees, etc. Orizaba. (Bruner 50).

This agrees with specimens in hb. Tuck. under this name, but is not the *linearis* of Nylander. Spores straight or curved, $\frac{12-18}{4\frac{1}{2}-7}$ mic.

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[1] Edited by Prof. C. E. Bessey, University of Nebraska, Lincoln, Nebraska.

R. laevigata Fr. Trees. Orizaba. (Smith 52).

R. denticulata (Eschw.) Nyl. Trees. Orizaba. (Smith and Bruner 53). Spores more or less curved, $\frac{13\text{–}16}{4\text{—}5}$ mic.

R. denticulata canalicularis Nyl. Trees. Orizaba. (Bruner 54).

Differs from the species in being smaller, slenderer, and the main branches becoming divided into many attenuate, channelled branches. Apothecia much as in the species. Spores smaller.

R. calicaris fastigiata (Pers.) Fr. Trees. Orizaba. Alt. 12,000 ft. (Smith 56).

R. calicaris fraxinea (L.) Fr. Trees. Orizaba. (Smith 55).

Apparently not as common as the preceding.

R. pollinaria Ach.? var.? "Trees in forest, slope of Mt. Orizaba, alt. 9–12,000 ft." (Smith 89).

Though this lichen has the aspect of *pollinaria* it differs in being more rigid, larger, and more densely branched, and in having narrower spores. It may prove to be undescribed.

Cetraria.

C. madreporiformis (Ach.) Müll. A single specimen on earth on Mt. Orizaba. (Smith 3).

Evernia.

E. furfuracea (L.) Mann. Trees. N. W. slope of Mt. Orizaba. (Smith 5).

Very plentiful at an altitude of 11,000–12,500 ft.

Usnea.

U. florida (L.) Hoffm. Trees. Orizaba. (Smith 6).

Abundant at 12,000 ft. alt.

U. florida strigosa Ach. Trees. Orizaba. (Bruner 8).

Plentiful.

U. florida mollis (Stirt.) Wainio. On oak trees, slope of Mt. Orizaba at Jalapasco. Alt. 9–11,000 ft. Not uncommon. (Smith 80).

U. florida rubiginea Michx. Trees. Orizaba. Rare. (Smith 79).

U. hirta (L.) Hoffm. Trees. Orizaba. (Smith 7).

U. ceratina Ach. Trees. Orizaba. (Smith 9).

U. angulata Ach. Trees. Orizaba. (Smith 13).

U. longissima Ach. Trees. Orizaba. (Smith 14).

U. cavernosa Tuckerm. "Hanging from branches of oak trees, Jalapasco." Alt. 10–12,000 ft. Abundant. (Smith 15).

This species is sometimes mistaken for *U. plicata,* but may be readily distinguished by the scarcity of fibrils and by the lacunose surface, even when sterile.

Alectoria.

A. ochroleuca rigida Fr. On earth. Orizaba. Common. (Smith 1).

A. fremontii Tuckerm. Trees. Orizaba. (Smith 4). Often mixed with *Usnea cavernosa.*

Theloschistes.

Th. flavicans (Sw.) Müll. Abundant on trees. Orizaba. (Smith 41).

This is certainly distinct from *Th. chrysophthalmus* and should be maintained as a species.

Parmelia.

P. perlata (L.) Ach. "Growing on rocks near warm springs," Aguascalientes; Orizaba. (Smith and Bruner 27).

The thallus is not always as smooth as is common in this species.

P. latissima Fee. Trees. Orizaba. (Smith 28).

Thallus sometimes isidiophorous.

P. perforata (Jacq.) Ach. Trees. Orizaba. Common. (Smith and Bruner 29).

P. perforata hypotropa Nyl. Trees. Orizaba. (Bruner 30).

P. cetrata Ach. Oak trees N. W. slope of Mt. Orizaba. Alt. 10–12,000 ft. (Smith 31).

P. revoluta (Floerke) Nyl. Trees. Orizaba. (Smith 33).

P. kamtschadalis americana (M. & F.) Nyl. "On oak trees N. W. slope of Mt. Orizaba." Alt. 11,000–12,500 ft. Very plentiful. (Smith 36).

P. caperata (L.) Ach. On oak trees at Jalapasco. Alt. 10,000 ft. Rocks, Aguascalientes. (Smith 34).

P. conspersa (Ehrh.) Nyl. Rocks. Orizaba; Aguascalientes. Common. (Smith 35).

Some of the specimens from the latter locality belong to the f. *isidiata* Anzi.

Phsycia.

Ph. hypoleuca (Muhl.) Tuckerm. At bases of trees among moss. Orizaba. (Smith and Bruner 62).

Ph. comosa (Eschw.) Nyl. Trees. Orizaba. Common. (Smith 38).

Ph. leucomela (L.) Michx. Trees. Orizaba. Abundant. (Smith 39).

Ph. leucomela angustifolia M. & F. With the preceding. (Smith 40).

Ph. stellaris (L.) Tuckerm. On oak trees at Jalapasco and elsewhere on Mt. Orizaba. Common. (Smith and Bruner 42).

It is often difficult to separate this from the following species.

Ph. astroidea (Fr.) Nyl. Trees. Orizaba (Smith); Cordova. (Smith and Bruner 45).

Ph. crispa (Pers.) Nyl. Trees. Orizaba; Aguascalientes. (Smith 46).

Apparently one of the commonest Physcias in this region.

Ph. major Nyl. Trees. Orizaba; Cordova. (Smith 43).

The specimens agree very well with Nylander's description and with specimens in hb. Tuckerm.

Ph. dilatata integrata Nyl. Trees. Cordova. (Smith 48).

Ph. caesia (Hoffm.) Nyl. A single specimen from Orizaba, infertile. (Smith 44).

Ph. obscura endochrysea Nyl. "On oak at Jalapasco, foot of Mt. Orizaba." Alt. 10,500 ft. A single specimen. (Smith 90).

Ph. setosa (Ach.) Nyl. A single specimen, infertile, collected on trees, Orizaba. (Smith 47).

Umbilicaria.

U. anthracina reticulata (Duf.) Schaer. Common on rocks at 14,000 15,500 ft. Mt. Orizaba. (Smith 81).

This plant is so different from typical *anthracina* that it should, more properly, be regarded as a distinct species.

U. hyperborea Hoffm. "Growing on rocks at lower snow line, 15,000 15,500 ft." Mt. Orizaba. (Smith 59).

U. hirsuta papyria Ach. "Foot of Orizaba." Alt. 15,000 ft. (Smith 60). A single specimen.

U. hirsuta grisea (Sw.) Th. Fr.? Rocks. Orizaba. Alt. 15,000 ft. (Smith 82). This plant is placed here with some doubt. If it is really *grisea* it is certainly distinct as a species from *hirsuta.*

U. vellea (L.) Nyl. With the preceding. (Smith 84).

Sticta.

S. aurata (Sm.) Ach. Trunks of trees, etc. Orizaba. (Smith and Bruner 57).

The specimens are in fine fruit, the apothecia being "ample, marginal, oblique," with a thin inflexed thalline margin.

S. tomentosa (Sw.) Ach.? Orizaba. (Smith 92). Sterile and fragmentary.

S. quercizans (Michx.) Ach. Trees, etc. Orizaba, (Smith and Bruner 58). Sterile. According to Wainio (Lich. Bres. I, 189) this species should be called *St. weigelii* (Ach.) Wain.

S. sylvatica (L.) Ach.? Rocks, etc., among moss. Orizaba. (Bruner 91).

Sterile and fragmentary.

Peltigera.

Pelt. canina (L.) Hoffm. On earth among moss; Jalapasco. (Smith 64).

Pelt. canina spongiosa Tuckerm. "On the ground in dense forest, lower slope of Mt. Orizaba." Jalapasco. Altitude about 12,000 ft. (Smith 65). Well characterized by the tufted fibrils and dense spongy nap of the under surface.

Pelt. rufescens (Neck.) Hoffm.? On ground among moss; Jalapasco. (Smith 66). Sterile and fragmentary.

Pannaria.

Pan. rubiginosa (Thunb.) Delis. Trees. Orizaba. (Smith 24).

Pan. molybdaea (Pers.) Tuckerm. Trees. Motzerongo. (Smith 25). Sterile and fragmentary.

Pan. molybdaea cronia (Tuckerm) Nyl. Trees. Cordova. (Smith 26).

The thallus agrees well with Tuckerman's specimens, but the disks of the apothecia is redder and the spores are somewhat smaller.

Collema.

C. aggregatum implicatum (Nyl.) Tuckerm. Branches of trees; Orizaba. (Smith 16).

C. aggregatum glaucophthalmum (Nyl.) Tuckerm. With the preceding. (Smith 67).

Leptogium.

L. pulchellum (Ach.) Nyl. Trees, etc. Orizaba. (Smith 23).

Spores larger than usual, and much like those of *L. chloromelum* measuring $\frac{25-36}{8-12}$ mic.

L. tremelloides impresso-punctata Tuckerm. hb. Orizaba. (Smith 19).

Readily recognized by the impressed pits scattered over the upper surface.

L. chloromelum (Sw.) Nyl. Rocks. Aguascalientes. (Smith 22). What is apparently the same thing was collected at Orizaba growing with moss on trees.

L. bullatum (Ach.) Mont. Trees. Orizaba. (Smith 17).

L. phyllocarpum (Pers.) Nyl. Trunks of trees. Orizaba. (Smith 20).

This species is very common and is represented also by several varieties.

L. phyllocarpum isidiosum Nyl. With the species. (Smith 86).

L. phyllocarpum macrocarpum Nyl. With the preceding. (Smith 21).

Apparently one of the commonest varieties.

L. inflexum Nyl. Orizaba. (Smith 18). This species seems well distinct from *L. burgessii.*

L. inflexum isidiosulum Nyl. With the species. (Smith 93).

THOMAS A. WILLIAMS.

The Simultaneous Origin of Similar (or identical) Varieties from Different Stock.—In the summer of 1883, there appeared in a crop of Challenger Lima Beans (a garden form of *Phaseolus lunatus* in which the pods and beans are much thicker than the type), growing near Newark, N. J., a dwarf plant showing no tendency to twine or climb, but in all other respects like the Challenger Lima with its distinguishing characteristics highly developed. Eighty per cent of the seed product of this plant produced dwarf plants, the remaining twenty per cent reverting to the regular Challenger Lima type. Of the product of the eighty per cent of dwarf plants, all, or practically all were dwarf, and thus a dwarf variety of *Phaseolus lunatus* was established.

In the summer of 1884, there appeared in a crop of large White Limas (a garden form of *Phaseolus lunatus* in which the pods and beans are larger and a little flatter than the type) growing near Kennett Square, Penna., a dwarf plant showing no tendency to climb, but in all other respects like the large White Limas. Sixty-six per cent of the seed of this plant produced dwarf plants, and in the succeeding generations practically all of the plants were dwarf, thus giving us a second dwarf variety of the species. The seed from which the Kennett Square crop was grown had been produced on the same farm for several generations, and there is no possibility of the two dwarf sorts tracing back to the same stock within ten generations at least. About the same time there appeared a dwarf form of the very distinct Small White Lima or Seewell, another garden variety of the species, the dwarf plant having all the characteristics of the parent variety except the rank growing twining vine.

Again, the White Plume and Golden Self Blanching varieties of Celery, are of a distinct class of so-called self blanching sorts in which the inner leaves assume in one case a white and in the other a yellow color as the plants approach maturity. There were no such varieties in cultivation until the White Plume appeared in New Jersey and the Golden Self Blanching appeared about the same time in France. There are many other instances of the appearance at about the same time in different locations and from distinct strains of seed, of a variation previously unknown to the species, and generally each sport retains the general character of the strain from which it sprang, having only the new variation in common.

I have annually, for the past ten years, carefully looked over from 1000 to 2000 acres of cucumbers, and a proportionate area of other vegetables all grown for seed, my object being to note any impurities or tendencies to variation in the stock, and again and again I have found some particular variation, often an undesirable one which I had never seen before, but of which I would find many repetitions during that and the succeeding one or two seasons, after which they would often disappear and give place to some new and equally distinct type. I have often noticed that any particular style of sport common to the season was common to all varieties of the species on which it occurred. I offer no theory in explanation and make no comments, but simply put on record my observations.

WILL. W. TRACY.

Some Features of the Native Vegetation of Nebraska.—The natural vegetation of Nebraska is emphatically that of the Great Plains, and thus differs much from that of the forests to the eastward, and the mountains lying westward. To say that the eastern botanist notes the absence of many familiar plants signifies nothing, since this must always be the case in comparing the flora of one region with that of another. The flora of the plains differs in many things from that of New York and New England, but the eastern man must not unduly magnify the importance to be attached to the fact that he does not find here many of the plants he knew in his boyhood days. The plains have their own plants which will eventually be as dear to the men and women who gathered them in childhood, as are the old favorites to the New Englander transplanted to the west.

A study of the vegetation of Nebraska begun somewhat more than a decade ago, soon showed that it possessed some remarkably interesting features, which my own annual botanizing trips, and the more extended explorations by the "Botanical Seminar" have brought out in stronger light. The native plants of the State are very largely immigrants from surrounding regions. By far the greater number have come from the prairies and forests lying immediately on the east and southeast, creeping up the rivers and streams, or in case of herbaceous plants, blowing overland with a disregard for the water-courses. Thus of the one hundred and forty-one trees and shrubs which grow naturally within our borders, all but about twenty-five have migrated from the east, in nearly all cases following the streams. Of these twenty-five, about four or five may be considered strictly endemic, the remainder having come down from the mountains. In several expeditions made by members of the "Botanical Seminar" along the Missouri River from the southeast corner of the State to the mouth of the Niobrara River, it was found that many species of trees and shrubs are confined to limited areas in Richardson and the adjoining counties, (in the extreme southeastern corner of the State) and that the number of species decreases with a good deal of regularity as we ascend the river. The same general law is seen as we ascend the three great rivers, the Republican, Platte and Niobrara, which cross the State from west to east. On the other hand, as we ascend the streams, we meet here and there a mountain tree or shrub which is wandering eastward down the slope from an elevation of a mile above sea-level, in the western counties, to less than a thousand feet along the Missouri River. Thus the Buffalo Berry, Golden Currant, Low Sumach, the Dwarf Wild Cherry, and Yellow Pine have travelled half way or two-thirds across the plains; while the Creeping Barberry, Greasewood, Black Cottonwood, Rydberg's Cottonwood, Mountain Maple, Mountain Mahogany, and Sage Brush barely enter the western counties, not extending eastward of the Wyoming line more than a few miles. A couple of species of Wild Roses, the Sand Cherry, and, perhaps, the Sand Plum, appear to belong strictly to the plains.

The grassy vegetation, and the other herbaceous plants present a similar commingling of eastern and western species. Every mile which one advances to the westward brings him in contact with plants not hitherto seen, while at the same time he leaves behind him some familiar species. I know of no other place on the continent where there is a finer illustration of the commingling of contiguous floras than is to be found on the Nebraska Plains. Not a few of the herbaceous species in the southern half of the State have come up from the plains of the southwest, some, even, coming from Texas and New Mexico. Others, again, appear to have migrated from the great northern plains of the Dakotas, while here again there are endemic species, as the Buffalo Grass, Redfield's Grass, False Buffalo Grass, and many of the more showy higher plants.—CHARLES E. BESSEY.

The Division of Agrostology.—Among the things of botanical interest done by Congress, the establishment of the Divison of Agrostology in the Department of Agriculture may well be ranked as of most importance. The purpose of this division is set forth as follows in the bill making the appropriation.

"*Investigations and Experiments with Grasses and Forage Plants, Division of Agrostology:* Field and laboratory investigations relating to the natural history, geographical distribution, and uses of the various grasses and forage plants, and their adaptability to special soils and climates; establishment and maintenance of experimental grass stations; employment of local and special agents and assistants; collection of seeds, roots, and specimens for experimental cultivation and distribution; materials, tools, apparatus, supplies, and labor required in conducting experiments; freight and express charges and traveling expenses; the preparation of drawings and illustrations for special reports, and the preparation of illustrated circulars of information, bulletins, and monographic works on the forage plants and grasses of North America, fifteen thousand dollars."

The liberal spirit of Secretary Morton toward scientific investigation is well shown in the wording of the section quoted, and it is a pleasure as genuine as it is rare, to be able to fully and heartily commend an action initiated wholly by a Government official. The wisdom of selecting a man who is more than, and above the mere politician for the Department of Agriculture, was never better illustrated.

CHARLES E. BESSEY.

Gray's Field, Forest, and Garden Botany.[1]—Twenty-seven years ago Dr. Gray brought out the first edition of a book under this name, which has been very widely used in the public schools of the United States, even beyond the territory for which it was intended. The old book had long outlived its usefulness, and a new edition should have been made long ago, but the death of its author delayed the revision until the present time, when from the hand of Professor Bailey we have the rewritten work.

The familiar appearance of the old book is preserved, as well as the general mode of treatment, the sequence of families, etc. In the words of Professor Bailey "it is still Asa Gray's botany, and the reviser has attempted nothing more than to bring it down to date." That this work has been conscientiously done is shown on every page, and no man need ask for a more faithful adherence to the spirit of the older book than we find here. Yet this did not prevent the introduction of some modern ideas. We all know how candid a mind Dr. Gray always possessed, and how open it was to the reception of new ideas. Accordingly we find that the relation of the Angiosperms to the Gymnosperms is properly given in the new book, and that the latter are no longer "sandwiched" between the Dicotyledons and Monocotyledons.

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[1] Field, Forest and Garden Botany; a simple introduction to the common plants of the United States east of the 100th Meridian, both wild and cultivated. By Asa Gray, late Fisher Professor of Natural History in Harvard University. Revised and extended by L. H. Bailey. American Book Company, New York.

Among other improvements to be noted in this edition are, the useful table of contents and the four pages entitled "nomenclature," the latter including valuable biographical data. The citation of the authority for each plant name will be useful in accustoming young students to the practice of botanists, but it is to be regretted that the old method had to be followed. This and a few cases in which an obsolescent nomenclature was followed, show the folly of the publishers in insisting upon too close an adherance to Dr. Gray's views of ten or more years ago. In life Dr. Gray frequently changed his views, as became a candid man of science, and it is an injustice to his memory for the "President and Fellows of Harvard College" to require that his books shall remain essentially unchanged. They would not dare to do so with a work on Chemistry or Physics, why should they for one on botany? When they authorize another edition of Dr. Gray's works they would do well to follow the example of our German friends, who are bringing out a new edition of Rabenhorst's "Kryptogamen Flora."

Professor Bailey has taken much care in the selection of the additions which he has made, and rightly he has given preference to those which are cultivated rather than the wild species. It appears from the reviser's estimates that this edition contains 553 species more than the former one, which represents considerably more than so many actual additions, since some species have been omitted. The new book will be very useful.

CHARLES E. BESSEY.